

NATO would have to move reinforcements from other corps sectors. Many NATO reinforcements would probably have to travel long distances to reach the main attack sector, so the likelihood of a Pact breakthrough might be high.

Force ratios deemed too favorable to Pact forces by U.S. Army tacticians could occur in part because of the Pact's numerical advantage in weapons. Of special concern is the Pact's advantage in numbers of tanks (2.64:1), armored personnel carriers (1.2:1), and artillery (2.07:1). In addition, the superior quality of equipment has been a subject of growing concern. This imbalance and the resulting force ratios have given impetus to the U.S. drive for modernization programs.

### THE FORCE BALANCE AFTER MODERNIZATION

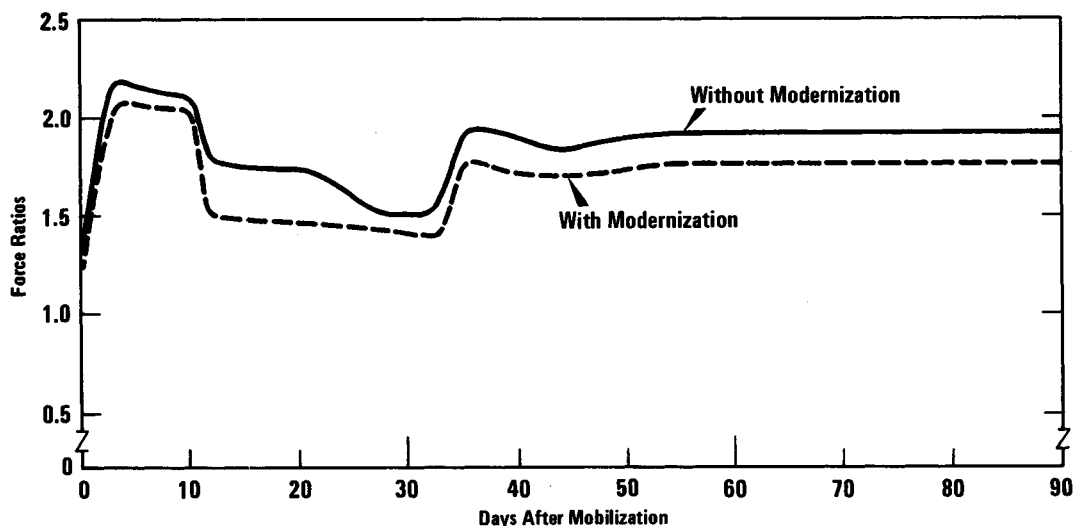
The programs of the United States and its NATO allies would improve by approximately 23 percent the capabilities of the NATO forces over the 1980 scores underlying the ratios shown in Figure 2. This assumes that U.S. forces improved by 35 percent and West German forces by 25 percent. (Capabilities of the other NATO allies are assumed unchanged because of the limited scope and uncertain progress of their modernization efforts.) If the Pact nations continue to modernize at current rates, they will increase their firepower by about 26 percent. Thus, the modernization now planned for NATO will merely maintain the present force balance; force ratios 30 days or more after mobilization would remain around 1.7:1. In other words, the United States is planning to spend at least \$46 billion over the next five years just to hold onto the status quo. Without modernization, though, the NATO position could markedly worsen--ratios would hover around 1.9:1 (see Figure 3).

### Effects of Different Assumptions on the Force Balance

The potential value of the U.S. modernization plan (measured by force ratios) can vary significantly, depending on what demands U.S. ground forces are called upon to meet. The following section illustrates this sensitivity to different assumed military scenarios.

Potential Significance of the Rapid Deployment Force. Increasing attention has been focused on possible military operations outside of NATO Europe during the past two years. In 1980, the headquarters for the Rapid Deployment Joint Task Force was established at MacDill Air Force Base in Tampa, Florida, with the mission of responding to contingencies outside of NATO Europe. If some U.S. forces are not available for a NATO defense,

Figure 3.  
Effects of Modernization on Force Ratios in Europe's  
Central Region 90 Days After Mobilization: 1987



SOURCE: Congressional Budget Office.

NOTES: Assumes continuation of Warsaw Pact modernization at current rates and completion of U.S. Administration and West German modernization programs. Includes U.S. augmentation of POMCUS to six division sets.

the European balance of forces could be adversely affected. Such a situation could arise from the commitment of U.S. forces to the new Rapid Deployment Force.

As it is currently configured, the RDF could consist of up to 200,000 troops, to include as many as 100,000 reservists. No new combat forces have been created for the RDF, however. Existing units from all four services have been earmarked as available to the RDF. Army units currently available include the 82nd Airborne, the 101st Air Assault Division, the 24th Mechanized Infantry Division, and the 6th Combat Brigade (air cavalry). The assumption, then, is that any contingency involving the RDF would draw upon combat forces committed to NATO.

If each of these particular units were dispatched with the RDF simultaneous with an outbreak of conflict in Europe, U.S. ground force capability in NATO would be diminished. If three divisions were detained on an RDF mission, the Pact/NATO force ratio within some four weeks of mobilization would be 1.8:1 rather than 1.7:1. Similarly, if five U.S. Army divisions were committed to the RDF, the force ratio would be approxi-

mately 1.9:1 within four weeks of mobilization. Of course, such a reduction of force capability would occur only if the RDF units were committed and a simultaneous NATO conflict occurred.

Additionally, if the RDF Task Force were to be committed, it would require combat service support units--such as truck and medical units--from both the active and reserve forces. Almost 70 percent of these support units would come from the active force, since they could respond most quickly. All of these support units, however, would be needed for a NATO contingency.

A Limited Warsaw Pact Threat of 90 Divisions. Not all alternative assumptions favor the Warsaw Pact. Indeed, one reasonable assumption--a limit on the Warsaw Pact threat because of a lack of cohesion within the alliance--could improve NATO's prospects substantially. The previous analysis of the force balance in Europe is based on the assumption that the Soviet Union and its Eastern European allies would commit 120 divisions to the Central Region and operate militarily as a unified body. This assumption is deemed essential in defense planning in order to visualize the worst possible scenario for NATO. In reality, however, there are political indications that the Pact nations might not all function in concert in a military effort.

If, for example, the Eastern European armies were assumed to be unreliable or used as garrisons for rear areas to protect Soviet logistics lines, then the analysis of force ratios in the event of a Soviet attack would change.<sup>5/</sup> In such a case, only 90 divisions would presumably be available to attack NATO forces, since about 30 of the total 120 Pact divisions assumed in the base case are Eastern European forces. (The Defense Department also assumes a threat of 90 divisions, though not necessarily for the same reasons.) In the initial ten days after a Warsaw Pact mobilization, the assumption of a 90-division threat would lead to a force ratio of approximately 1.2:1, and the ratio would stabilize at that level within four weeks. This is a scenario that the Army would find far more favorable.

Other Assumptions that Might Improve the Balance. Whereas the basic analysis assumes that the Pact nations plan to allocate all new weapons to confronting NATO, in fact, the Pact might allocate some of the newer weapons to forces defending against other threats. If, for example, the Soviets were to allocate their new weapons in proportion among all existing divisions, rather than just modernizing those divisions focused on NATO, then the force ratios over the next five years might be tipped in favor of NATO.

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5. See Congressional Budget Office, U.S. Ground Forces.

Moreover, the Warsaw Pact may modernize more slowly than it has recently--perhaps because of economic pressures or intra-alliance frictions such as those occurring in Poland. NATO's efforts might then be able to improve the present force imbalance. Recent years have not, however, brought any major slowdown in the Warsaw Pact's production of ground force materiel.

Finally, the force balance in Europe could also be altered in favor of NATO if all of the NATO allies were able to modernize as aggressively as the United States intends to do. If, for example, all of the NATO nations improved their force capabilities by approximately 35 percent over the next five years--as the U.S. plans to do--and the Warsaw Pact continued its modernization at current rates, then the theater-wide force ratio could reach roughly 1.6:1 by four weeks or longer after mobilization. Current economic conditions in Western Europe and the United States, however, suggest that this course would be unlikely.

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## CHAPTER IV. OPTIONS

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In view of the anticipated size of the federal deficit--the CBO is currently projecting a deficit of some \$155 billion for 1983--the Congress is considering numerous cost-cutting measures. The ground force modernization program is of course one area in which economies are under examination. This chapter therefore presents two alternatives to the current program that would bring down the costs of the Army's ground combat modernization from the total five-year sum of at least \$46 billion now projected for all nine major systems proposed. As a basis for comparison, the chapter first reviews the costs (detailed in Chapter II) of the current program.

### ALTERNATIVE APPROACHES FOR ARMY MODERNIZATION

The three courses available to the Congress examined in the first portion of the chapter are:

- o Option I--Continuation of current policy as embodied in the Administration's modernization program;
- o Option II--Reduction in the rate of acquisition; and
- o Option III--Modification of the composition of the program.

The military effects to be achieved by Option I are examined in detail in the preceding chapter and recapitulated here in brief. For the hypothetical Options II and III, this chapter gives comparable analysis. Table 4 summarizes the projected procurement rates of the ground combat weapons systems examined in this study according to each of these alternatives.

As Chapter II states, however, even an effort as sizable and expensive as the Administration's program would accomplish little more in terms of the NATO/Warsaw Pact force balance than maintaining the status quo. Pact modernization is expected at least to stay abreast of NATO efforts. But with the likelihood of continuing Pact gains, maintaining the status quo may be a critically important policy objective. Thus, even in the current climate of fiscal austerity, it may be useful to know what actions and costs would be entailed in actually encroaching on the Warsaw Pact's advantage. Accordingly, this chapter concludes with a discussion of approaches that would permit the NATO allies to achieve an advantageous force balance in Europe.

TABLE 4. EQUIPMENT PROCUREMENT RATES UNDER ADMINISTRATION PLAN, REDUCED PACE OPTION, AND MODIFIED PROGRAM COMPOSITION OPTION, BY WEAPONS SYSTEM: 1983-1987 (In numbers of units)

Weapons System by Option	1983	1984	1985	1986	1987	Total
<b>M1 Tank</b>						
Administration	776	1,080	1,080	1,080	1,080	5,096
Slowed procurement	720	720	720	720	720	3,600
Altered composition	776	1,080	1,080	1,080	1,080	5,096
<b>Fighting Vehicle System (FVS)</b>						
Administration	600	555	775	1,009	958	3,897
Slowed procurement	600	600	600	600	600	3,000
Altered composition	600	555	775	1,009	958	3,897
<b>Multiple Launch Rocket System (MLRS)</b>						
Administration	72	76	44	29	b/	221
Slowed procurement	72	76	44	29	b/	221
Altered composition	72	76	44	29	b/	221
<b>Apache Attack Helicopter (AH-64)</b>						
Administration	48	96	125	140	26	435
Slowed procurement	48	96	96	96	96	432
Altered composition	48	96	125	140	26	435
<b>Hellfire Missile a/</b>	3,971	6,218	5,683	6,853	6,351	29,076
<b>Division Air Defense (DIVAD) gun</b>						
Administration	96	130	132	144	66	568
Slowed procurement	96	96	96	96	96	480
Altered composition	c/	c/	c/	c/	c/	c/
<b>Army Helicopter Improvement Program (AHIP)</b>						
Administration	--	16	44	56	92	208
Slowed procurement	--	16	44	56	92	208
Altered composition	c/	c/	c/	c/	c/	c/

SOURCE: Congressional Budget Office

- a. Procurement of the Hellfire Missile is assumed constant in all options.
- b. Procurement of the MLRS projected to be complete in 1986.
- c. Altered composition option assumes deferment of DIVAD and AHIP.

## Option I--The Administration's Present Plan for Army Modernization

The Administration's program to modernize Army equipment and preposition two more division sets of equipment under the POMCUS program would have important effects on capabilities, both in the early and later stages of a buildup. The POMCUS additions would improve the force balance in the first days after a mobilization began. Within ten days after NATO mobilization, the Pact/NATO force ratio in the Central Region of Europe would drop from the 1.65:1 now achievable to 1.48:1. This increased capability would satisfy the Army's minimally acceptable force ratio of 1.5:1.

The equipment modernization aspects of the program would, upon completion of procurement, affect capabilities throughout a buildup by the percentages presented in Chapter II and summarized in Table 5. Total U.S. firepower would increase by about 35 percent. The time when modernization yielded its most visible benefits would be later, after a mobilization, when all U.S. reinforcement units had arrived in Europe. Because even a complete inventory of the equipment to be modernized by 1987 would merely match, and not outweigh, Pact capabilities, however, force ratios 30 or more days after mobilization would remain around 1.7:1--markedly above the Army's stated acceptable 1.5:1 level. Of course, the ratios would be worse for NATO--1.9:1--were there no U.S. modernization (see Figure 3 in Chapter III).

The clearest problem with the Administration's program is its total five-year cost of about \$37.6 billion (see Table 5). This amount (for seven major systems plus the costs for additional POMCUS materiel) is a substantial part of the total Army procurement bill, which will amount to at least \$60 billion over the next five years. <sup>1/</sup> Even after adjustment for inflation, this represents an average annual increase of at least 6 percent over costs had the 1982 levels of procurement spending continued. In view of anticipated federal deficits, this rate of increase may not be affordable. And cutting the procurement associated with numerous other support systems (such as trucks and generators) may not be the way to reduce these costs, since these support vehicles often must replace aging systems. In many cases, the Army already has shortages in these areas. Other approaches to cost cutting that focus on the major weapons systems may be more productive areas for Congressional consideration.

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1. Rather than withdraw materiel from current inventory, this analysis assumes that the Army would procure the equipment for two additional POMCUS division sets. The costs include procurement of all equipment other than tanks and fighting vehicles in a division set.

## Option II--Slowing the Rate of Ground Combat Modernization

As current deficit-reducing efforts suggest, the Army may have to seek ways to achieve as much as possible of its modernization program at lower cost. One approach could be to continue to procure all of the weapons systems now proposed by the Administration but at slower rates. In addition, this option would forego the Administration's proposed prepositioning of two additional POMCUS division sets in Europe. It would, though, retain the emphasis on introducing more capable armor and anti-armor systems, but it would somewhat delay completion of the program. It would achieve some budgetary savings relative to the Administration's program, but at some cost in overall improvement in force capability (see Table 5). Variations of this approach (commonly called a "stretchout") have been adopted in previous years. <sup>2/</sup>

As outlined here, this option would largely limit procurement to minimum production quantities, given current or planned facilities and planned use of those facilities. For example, this option would produce 720 M1 tanks a year, starting in 1983 instead of the 776 planned; this represents a minimum production rate--the output at the two existing tank plants, assuming they operate one eight-hour shift a day, five days a week. The procurement profiles for the FVS, AH-64, DIVAD gun, and AHIP would also represent minimum production quantities. <sup>3/</sup> Only the buy of the MLRS would not change, since it is already nearly complete.

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2. Both the M1 tank and FVS programs were "stretched out" in the original fiscal year 1982 budget, submitted by President Carter, as compared with the planned program submitted with the 1981 budget. For example, in fiscal year 1982, the Administration proposed to buy 445 fewer tanks over the 1982-1985 period than were planned in the 1981 budget. Further, 151 fewer tanks were proposed for procurement in 1982 than were planned for in the 1981 budget. Similarly, over the period 1982-1985, almost 1,300 fewer FVSs were planned for procurement in the 1982 budget than were planned in the outyear program associated with the 1981 budget. See Department of the Army, "Congressional Data Sheets in Support of the FY 1981 President's Budget" (1980) and Department of the Army, "Congressional Data Sheets in Support of the FY 1982 President's Budget" (January 1981).
  3. This option would produce 600 FVSs a year--the output at one plant operating two shifts for eight hours a day five days a week. The DIVAD gun would be produced at an annual rate of 96; this represents one shift's output of a plant five days a week. The AH-64 would be produced at a rate of 96 a year starting in 1984.



Relative to the Administration's program, this option would cut 1983 procurement costs by \$330 million and by a total of \$6.2 billion over the five years (see Table 5). Besides the savings from reducing procurement rates, about \$1.6 billion would be saved over the next five years by adding no further POMCUS equipment.

Foregoing the prepositioning of two new divisions' worth of equipment in Europe would modestly decrease capabilities shortly after a mobilization. Without the new POMCUS equipment, force ratios would be about 1.65:1 ten days after mobilization, which is appreciably above the Army's minimum ratio of 1.5:1. (With the additional prepositioning, the ratio would be 1.48:1.) On the other hand, many critics of the Administration's plan have argued that prepositioning two more division sets of equipment, in addition to the four already in place, would expose too much U.S. equipment to potential destruction before U.S. reinforcements arrived. Further, the addition of more equipment in Europe could reduce the Army's flexibility to deploy units anywhere else.

This option would also slow modernization, although not by major amounts. When all the equipment purchased was delivered, the Army could modernize the following percentages of the active force (compare with page 20 for Administration's plan):

<u>Force or fleet</u>	<u>Modernized System</u>	<u>Percentage of Force Modernized by 1987</u>
Tanks	M1 tank	75
Armored personnel carriers	FVS	52
Artillery rocket systems	MLRS	100
Attack helicopters	AH-64	37
Air defense guns	DIVAD gun	86
Scout helicopters	AHIP	36

Looked at another way, this program would delay the completion of systems from one year (for DIVAD) to as many as three years (for the FVS).

Slower modernization would also mean that, when all the equipment was delivered, Army firepower would be greater by about 32 percent, rather than the 35 percent to be achieved by Option I. This would mean that, 30 days or more after mobilization, the Pact/NATO force ratio would rise to 1.77:1 compared to 1.7:1 under the Administration's plan.

As all these measures suggest, this option would leave NATO worse off in the event of a conflict, but only modestly so. Thus, this option is

consistent with a willingness to accept slight added risks in recognition of the need to accommodate tight fiscal constraints.

One drawback to this option is that, with stretchouts, unit costs would rise, because savings that normally come with production experience would be delayed, and because certain numbers of units would be produced later, when inflation has pushed up costs. For example, 1984 acquisition unit costs of the M1 tank under this option would be at least 6 percent higher than under the Administration's faster approach. The increase is small, because this option would not allow production to fall below minimum economical rates, given current or planned facilities. But even this quite moderate unit cost growth suggests why the Defense Department is committed to maintaining high rates of production.

Another possible problem is that the savings achieved under this option are close to the maximum that can be achieved without further increases in unit costs. For example, if M1 tank procurement were cut to 600 (versus the minimum economical rate of 720 in this option), then acquisition unit costs in 1984 would be at least 8 percent higher than under the Administration's plan to buy 1,080 tanks. Thus, if the Congress must save larger amounts, or if it wants to keep the unit costs from rising above current levels, it might wish to consider altering the actual composition of the modernization program.

#### Option III--Modifying the Composition of Ground Combat Modernization

To achieve budgetary savings, this alternative would sustain procurement of most major armor and anti-armor systems at higher rates of production while indefinitely deferring a few. Specifically, this option would delay procurement of the DIVAD gun and the AHIP.<sup>4/</sup> Like Option II, it would also forego the prepositioning of the two additional divisions sets of equipment in Europe.

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4. Postponement of these systems might be appropriate in light of criticisms that have been raised regarding the cost and performance of the AHIP and the DIVAD gun. Criticism of the AHIP has centered around costs and the system's optimization to a particular geographic location. Criticism of DIVAD has ranged from concern regarding the gun's vulnerability to radar-homing missiles, to its obsolescence relative to improved Warsaw Pact capabilities. For amplification, see Deborah G. Meyer and Benjamin F. Schemmer, "... You ought to look at what's happening on the other side of the two-way street," Armed Forces Journal (September 1982), p. 82; and Gregg Easterbrook, "DIVAD," Atlantic Monthly (October 1982), pp. 29-39.

TABLE 5. COSTS AND COMPLETION DATES OF GROUND COMBAT MODERNIZATION UNDER ADMINISTRATION PLAN, REDUCED PACE OPTION, AND MODIFIED COMPOSITION OPTION

Total Costs 1983-1987 (in billions of dollars) <u>a/</u>	Pace of Modernization <u>b/</u>			Percent Improvement in Overall Force Capability
	System	Percent Modernized Through 1987	Year When Modernization Complete	
Option I. Administration Program				
37.6	M1 Tank	96	1988	35
	FVS	63	1990	
	MLRS	100	1986	
	AH-64	37	1995	
	DIVAD gun	100	1987	
	AHIP	36	1991	
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Option II. Slowed Pace of Procurement				
31.4	M1 Tank	75	1990	32
	FVS	52	1993	
	MLRS	100	1986	
	AH-64	37	1995	
	DIVAD gun	86	1988	
	AHIP	36	1991	
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Option III. Modified Program Composition				
31.2	M1 Tank	96	1988	<u>c/</u>
	FVS	63	1990	
	MLRS	100	1986	
	AH-64	37	1995	
	DIVAD gun	0	1992 and beyond	
	AHIP	0	1992 and beyond	

SOURCE: Congressional Budget Office.

- a. In inflated dollars.
- b. Requirements for weapons to fill force structure are based on CBO estimates (see Appendix D).
- c. DIVAD and AHIP excluded in force effectiveness analysis.

Over the 1983-1987 period, the investment costs of this modernization option will total roughly \$31.2 billion, or some \$6.4 billion less than the Administration's proposal. Again, about \$1.6 billion of these savings would derive from not adding to the POMCUS program.

As under Option II, foregoing the POMCUS additions would reduce NATO capabilities early in a buildup. This approach would, however, minimize the amount of U.S. equipment that was vulnerable before reinforcements arrive and would not reduce the Army's capabilities to deploy troops elsewhere. Unfortunately, though, assessing the effects of this approach on NATO capabilities over time is more difficult. It would sustain the procurement rates for all the ground attack systems--which this study is intended to analyze--and neither of the two systems that would be deferred are ground attack systems. The analysis cannot serve to illustrate the effects of postponing these two systems, however. The potential loss in operational capability that could result if these systems were not available can be assessed in descriptive terms only; it cannot be quantified numerically or expressed in terms of the effects on force ratios.

To counter enemy helicopters without the DIVAD gun, the Army would have to rely primarily on the existing Vulcan air defense gun. The Vulcan gun lacks the sophistication of the DIVAD gun; for example, the Vulcan has only a 20-millimeter gun system with an effective range of two kilometers, and it lacks the DIVAD's all-weather capability. Thus, some compensating changes would have to be made. The Vulcan gun could be supplemented by augmented numbers of the Stinger air defense missile, which is now deployed. (The Stinger--of which some 1,600 are now deployed--is a shoulder-fired missile that homes in on a heat source; its primary mission is to attack low-altitude aircraft and helicopters.) More use of the Stinger along with the Vulcan would give a broader array of capabilities even if the Army had no DIVAD guns. Both the Vulcan and DIVAD guns have the drawback of being vulnerable to enemy helicopters.

As far as AHIP is concerned, this modification of the current-generation OH58 helicopter is considered only to be of temporary use. As Chapter II states, even as AHIP takes shape, the Army is developing a new fleet of helicopters that are likely to supersede the achievements of AHIP. This suggests that AHIP might consume \$2.5 billion in an effort to yield a product that, while highly sophisticated and functional, is only an interim solution for the scout helicopter mission.

As this discussion suggests, then, some capabilities would be lost if DIVAD and AHIP were not procured. To whatever degree these capabilities seem critical, however, there may be other Army systems the

procurement of which could be delayed. Some analysts have suggested, for example, that alternatives to the FVS might provide substantial capability at lower cost; concerns have also been raised about the M1 tank that could argue for delaying the tank (see Chapter II). The exact systems chosen for delay would ultimately require difficult judgments by the Administration and the Army.

#### THE COSTS OF MOVING THE FORCE BALANCE BEYOND THE STATUS QUO

Even the most costly of the courses examined above--the Administration's modernization plan--would still yield force ratios that fall short of what the Defense Department and the Army would regard as optimal. Instead of the 1.7:1 ratio achievable 30 days after mobilization, the following section outlines what would be entailed coming closer to the Army's minimum acceptable force ratio of 1.5:1 if money were readily available to make such efforts.

#### Improvements from More Rapid Modernization

As a first step, the United States could accelerate its force modernization. Consistent with this more aggressive policy, prepositioning of two additional POMCUS division sets in Europe would also proceed.

In particular, the Congress could decide to increase the annual procurement levels of the M1 tank, the FVS, and the AH-64 to the maximum level possible with current or planned facilities. Such accelerated modernization would allow the Army to arm a larger proportion of the active force with new equipment by the end of 1987. By then, the Army would be able to modernize 111 percent of its operational tank fleet with M1 tanks (the excess over 100 percent would be used to fill additional war reserve stocks or additional POMCUS sets), 80 percent of the personnel carrier fleet with the FVS, and 47 percent of the attack helicopter fleet with the AH-64. Buys of the MLRS and the DIVAD gun could remain at the Administration's planned levels, since these rates of procurement would modernize the existing force fully within the coming five years. Procurements of the Hellfire missile and AHIP could also remain at the Administration's levels.

Table 6 shows the hypothetical procurement profiles under this approach. The analysis assumes that all of the weapons included in the Administration's proposal would be procured; the rates of procurement for the M1 tank, the FVS, and the AH-64 would be increased above those levels in the Administration's baseline program. The procurement profiles for

these three systems illustrate the maximum production rates for the programs. In the case of the FVS, for example, approximately \$234 million has been included for the special tools and facilities in 1983 and 1984 to meet maximum production rates.

Over the 1983-1987 period, the investment costs of this approach would total approximately \$44.7 billion. This represents a total five-year increase of \$7 billion over the Administration program's \$37.6 billion for the specific weapons systems considered in this study.

This accelerated plan would improve current U.S. force capability by more than 39 percent by the end of 1987. It would, however, by 30 days after mobilization, yield an all-NATO theater-wide force ratio of 1.68:1--still not as good as the Army's minimum benchmark of 1.5:1.

TABLE 6. PROCUREMENT PROFILES THAT WOULD ACCELERATE  
ARMY MODERNIZATION: 1983-1987 (In units)

Weapons System	1983	1984	1985	1986	1987	Total
M1 Tank	776	1,080	1,080	1,440	1,800	6,176
FVS	775	830	1,080	1,080	1,440	5,205
MLRS	72	76	44	29	<u>b/</u>	221
AH-64	48	96	125	140	140	549
Hellfire	3,971	6,218	5,683	6,853	6,351	29,076
DIVAD Gun	96	130	132	144	66	568
AHIP	<u>a/</u>	16	44	56	92	208

SOURCE: Congressional Budget Office.

- a. Scout helicopter modification program not to begin until 1984.
- b. Procurement of the MLRS completed in 1986.

## Improvements from Force Structure Increases

To improve the force balance appreciably by the late 1980s and simultaneously achieve a stable theater-wide ratio of at least 1.5:1, increases in the number of forces of both the United States and all the other NATO allies would have to accompany modernization. For example, the United States would have to add the equivalent of two fully supported armored divisions with 100,000 new troops to the active force structure. <sup>5/</sup> Moreover, the desired ratio would be achieved only by a NATO-wide effort. The NATO allies would have to add the equivalent of four fully supported armored divisions and improve the firepower of their existing divisions by means of aggressive modernization.

Production at maximum rates feasible with current facilities would not, however, provide enough weaponry to equip fully two new divisions by the end of the 1987 while also modernizing other divisions at an accelerated rate. Thus, the two new divisions might not be fully equipped until late in the decade. The additional costs to modernize fully the two new divisions are estimated at \$5.4 billion. (Approximately \$4.5 billion would be needed in 1988 and 1989 to complete production of the FVS.)

The personnel of the two new divisions would be based in the continental United States. On the basis of Army data, this study assumes that base construction would entail one-time costs of about \$4.7 billion. Inasmuch as these costs assume construction of new facilities for the troops, they probably represent upper bounds on costs. <sup>6/</sup>

The costs of increasing Army personnel by 100,000, including added enlistment bonuses necessary to increase recruitment, would come to about \$6.7 billion over the five-year period. <sup>7/</sup> This assumes that manpower

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5. The estimate of 100,000 additional troops assumes that the Army would add two armored divisions and all of its associated nondivisional structure (such as the nondivisional combat increment and the tactical support increment).
  6. See Congressional Budget Office, "Costs of Withdrawing Troops from Europe," Unpublished Staff Working Paper (June 1982).
  7. These costs include not only pay and allowances but also recruitment costs. The following assumptions were made: the ratio of officers to enlisted personnel is assumed to remain constant at current levels; the added costs also assume that the proportion of recruits holding high school diplomas would remain at levels consistent with those projected for a smaller force over the five-year period.

would be increased by 20,000 a year. Further, there would be added operating and support costs associated with two modernized divisions. These annual costs would total at least \$2 billion when the two divisions were complete.

The addition of 100,000 persons to the now all-volunteer Army could also encounter recruiting difficulties. While the U.S. economy is in its current condition, especially with unemployment at a post-World War II record high level of 10.4 percent (as of November 1982), recruitment is not a serious problem for the Army. But should a recovery materialize, other prospective employers, especially those in the private sector, could create tough competition for needed Army personnel. Indeed, without additional recruiting incentives, the Army would be unable to increase its active-duty manpower strengths while also meeting the minimum standards for recruit quality recently mandated by the Congress.<sup>8/</sup> Additional "targeted" pay (such as enlistment bonuses or educational benefits) aimed only at recruits with special skills that are now in short supply could probably allow the Army to meet its numerical goals for recruits and the minimums for recruit quality. These bonuses would add about \$885 million over the five-year period, costs that are included in the total discussed above. In recent years, however, reluctance has been expressed in the Congress over increasing spending on enlistment bonuses.<sup>9/</sup> Without these increases, recruiting goals would have to be met by lowering manpower standards, enacting costly across-the-board pay increases, or returning to some form of conscription.

Thus, Army costs for procurement and operation would come to \$17.9 billion over the next five years. Coupled with the costs of accelerated equipment modernization, this implies costs totaling \$25 billion. Nor are these all the potential costs. The two added divisions would, of course, be

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8. See Congressional Budget Office, "Alternative Military Pay Raises for Fiscal Years 1983-1987: Their Effects on Enlisted Recruiting, Retention, and Personnel Costs," Unpublished Staff Working Paper, (September 1982).
  9. See Congressional Budget Office testimony before the U.S. Senate Committee on Veterans' Affairs, July 28, 1982.



intended for use in a NATO war. The divisions and their equipment would be transported to Europe by sea--which might well require added ships with their own budgetary implications. 10/

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10. To deliver the two divisions to Europe within 14 days after mobilization, 16 additional fast sealift ships would be required. The estimated cost to procure these ships is as much as \$6.2 billion (in 1983 dollars). On the other hand, if the two divisions were to be delivered after 30 days following mobilization, eight ships would have to be procured; the estimated cost for procurement would total about \$3.1 billion (in 1983 dollars). This estimate is based on the procurement of fast sealift (roll-on/roll-off) ships.



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## CHAPTER V. LONG-RUN COSTS OF MODERNIZATION-- A SELECTIVE ASSESSMENT

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In considering projected costs of the Administration's proposed modernization program for the Army, a key issue of concern to the Congress is long-run costs. Important among these are the weapons systems' operating costs, which begin as new equipment is fielded and extend through the lifetime of each new system. This chapter charts the course of long-term operating costs of the M1 tank and the FVS mechanized infantry fleets. Examination of these two systems' operating costs over time gives an illustration of the order of magnitude of this cost component for the various systems the Administration proposes to procure.

Operating and support costs--which can account for as much as two-thirds of the total life-cycle costs of a weapon--will of course increase the Army's overall budget. Projected rises in the consumption of fuel and repair parts, as well as new maintenance concepts, all contribute to the higher operating costs of modernization. In some instances, increased firepower will also generate higher operating costs. For example, the turret and 25-millimeter cannon of the FVS will probably increase the requirements for mechanics and for cargo-carrying vehicles in a mechanized infantry battalion.

Providing adequate funds to operate and support the modernized systems is critical: effectiveness and combat readiness are a direct function of operating tempo. No single estimate is now available that projects the additional resources required to operate and support the force once it is fully modernized. In part, this is because the Army has only begun to field these new systems; the Army itself relies on test data and contractors' estimates. In the absence of any single overall cost estimate, the CBO has mostly used Army data to project the ongoing costs of operating and supporting the M1 tank and FVS battalions. <sup>1/</sup> These units

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1. The operating and support cost elements included in this estimate are the consumption of repair parts at the maneuver battalion, direct support maintenance battalion, and depot; petroleum, oil, and lubricants (POL); Military Manpower, both pay and military occupational specialty training. The CBO has used data from the following sources to derive its cost estimate: Force Cost Information System, Comptroller of the Army; and Department of the Army, Army Modernization Information Memorandum (August 1981).

account for approximately half of all active Army maneuver battalions and roughly one-fourth of the total active Army battalions.

Over the next five years, the Army plans to buy enough M1 tanks and FVSs to equip 50 tank battalions and 46 mechanized infantry battalions and to provide assets for training, systems in the maintenance pipeline, and some war reserve stocks. <sup>2/</sup> At present, the combined cost to operate and support these battalions, equipped with the current M113 armored personnel carriers and present-generation M60A1 tanks, is estimated at \$2.4 billion.

#### Costs for M1 Tank

The high procurement cost of the M1 tank relative to its two predecessors--the M60A1 and the M60A3--presages a comparable disparity in operating costs. The unit cost (in constant 1983 dollars) of the M1 is estimated at \$1.9 million--nearly 50 percent more than the \$1.2 million for the M60A3. A more sophisticated electronics system (including an on-board computer) and a system to stabilize the gun account for much of the difference. The M1 is much faster than either antecedent, but it also uses about two times as much fuel per mile.

The CBO estimates that, with the fielding of the M1 tank, the cost to operate and support a tank battalion will increase by as much as 41 percent over levels for battalions equipped with M60A1 tanks. (Costs would increase by 35 percent over levels for the existing but more modern battalions equipped with M60A3 tanks.) The higher cost will come from increased consumption of petroleum, oil, and lubricants, and importantly, from more expensive repair parts. The new "fix forward" concept of maintenance may also be more costly, since it relies on more test and diagnostic equipment at the "maintenance levels" closer to the battle area to facilitate the repair or replacement of damaged parts.

A comparison of the operating and support costs estimates for a tank battalion equipped with M60A1s and M1s is presented in Table 7. <sup>3/</sup> A range of estimates for the M1 is presented. The Office of the Comptroller of the Army estimates that the tank's operating and support costs will

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2. In some cases, the Army withdraws equipment to fill its POMCUS stocks; equipment could be withdrawn either from war reserve stocks or active units. (War reserve stocks are those items of equipment required to sustain combat until factories can produce replacements.) In other cases, the Army could buy additional equipment to fill its POMCUS stocks.
  3. The M60A1 tank battalion is chosen as a basis for comparison because the M60A1 is currently the mainstay in the active force.

TABLE 7. ANNUAL RECURRING OPERATING AND SUPPORT COSTS  
FOR TANK BATTALIONS (In millions of 1983 dollars)

Operating and Support Items	Army <u>a/</u> M60A1	Army <u>a/</u> M60A3	Army <u>a/</u> M1	M1 High
Repair Parts (P <sub>2</sub> Mission)	1.81	2.14	2.75	5.07 <u>b/</u>
Repair Parts (P <sub>2</sub> Base Operations)	0.14	0.14	0.14	0.14
Repair Parts (P <sub>7</sub> Maintenance)	1.09	1.10	1.57	3.05 <u>c/</u>
Subtotal	(3.04)	(3.38)	(4.46)	(8.26)
Other	6.14	6.15	6.65	6.65 <u>d/</u>
Secondary Items (Procurement Funded)	3.05	3.59	4.6	5.58 <u>e/</u>
Military Personnel	8.90	8.90	9.00	9.00
Total	21.13	22.02	24.71	29.50
Percent Change (from M60A1)	--	4	17	41
Percent Change (from M60A3)	--	--	12	35

SOURCES: Compiled by the Congressional Budget Office from sources cited below.

NOTE: P<sub>2</sub> Mission, P<sub>2</sub> Base Operations, and P<sub>7</sub> Maintenance refer to the different subprograms of the Operations and Maintenance appropriation.

- a. The source of the Army cost estimates is the Force Cost Information System (FCIS), Office of the Comptroller of the Army. Estimates were provided in April 1982.
- b. From Department of the Army, Army Modernization Information Memorandum (August 1981).
- c. Scaled using ratio at P<sub>2</sub>M level between M1 high and M60A1.
- d. FCIS Data; includes military occupational specialty training, supply, medical, and overhead.
- e. Scaled using unit procurement costs of \$1,066,846 for M60A3 and \$1,658,167 for M1 (constant 1981 dollars).

increase by approximately 17 percent over those of the M60A1. This estimate generally assumes that the maintenance workload required for the M1 will be roughly comparable to that required for the M60A1 tank, even though the M1 is more complex. The CBO's higher estimate of 41 percent, however, assumes a greater maintenance workload based on Army planning data now used in budgeting for the first M1 tank battalion, and provides an estimate of costs for secondary items (such as transmissions) that is adjusted in proportion to the procurement costs of the M1 and M60A3. For lack of any estimates for additional costs for maintenance personnel at central repair facilities ("depot" level), CBO assumes that these costs would be comparable to those required for the M60A1 tank. Depot maintenance may experience cost increases, however, since the new equipment will probably require mechanics with additional skills. (Notes to Table 7 detail data sources.)

#### Costs of the Fighting Vehicle System

The pronounced differences in capability between the new FVS and its predecessor, the M113 armored personnel carrier, will be reflected not only in unit procurement costs (\$1.2 million versus \$160,000) but also in operating costs. Whereas the M113 is essentially a tracked vehicle with no weapons and only light armor, the FVS has a turret, 25-millimeter cannon, and TOW missile launcher.

The CBO estimates that once the FVS is fielded, the costs to operate and support a mechanized infantry battalion could increase by 59 percent over levels for M113-equipped battalions. As with the M1 tank, cost increases derive from increased consumption in petroleum, oil, and lubricants, and from more expensive repair parts.

A comparison of the operating and support cost estimates for a mechanized infantry battalion equipped with M113s and with FVS is given in Table 8. A range of estimates is also provided for the FVS. The most recent estimates from the Office of the Comptroller of the Army suggest that the operating and support costs of the mechanized infantry battalion will increase by approximately 23 percent. (Earlier Army estimates put the increase as low as 3 percent.) This 23 percent estimate assumes that the FVS will require a maintenance workload generally comparable to the M113, even though the FVS is much more sophisticated. Alternatively, the CBO's higher estimate of 59 percent assumes a greater maintenance workload--particularly because of the incorporation of the turret--and adjusts the costs of the secondary items in proportion to the costs of the FVS and M113. As in the case of the tank battalion, the costs of depot maintenance personnel are assumed to be equal to those required for the M113, since current data are not available.

TABLE 8. ANNUAL RECURRING OPERATING AND SUPPORT COSTS  
FOR MECHANIZED INFANTRY BATTALIONS  
(In millions of 1983 dollars)

Operating and Support Items	Army <u>a/</u> M113	Army <u>a/</u> FVS	FVS High
Repair Parts (P <sub>2</sub> Mission)	0.77	1.93	3.50 <u>b/</u>
Repair Parts (P <sub>2</sub> Base Operations)	0.21	0.21	0.21
Repair Parts (P <sub>7</sub> Maintenance)	0.36	1.24	1.64 <u>c/</u>
Subtotal	(1.34)	(3.38)	(5.35)
Other	6.93	7.75	7.75 <u>d/</u>
Secondary Items (Procurement Funded)	1.26	3.41	9.40 <u>e/</u>
Military Personnel	12.73	12.86	12.86
Total	22.26	27.40	35.36
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Percent Change	--	23	59

SOURCES: Compiled by the Congressional Budget Office from sources cited below.

NOTE: P<sub>2</sub> Mission, P<sub>2</sub> Base Operations, and P<sub>7</sub> Maintenance refer to the different subprograms of the Operations and Maintenance appropriation.

- The source of the Army cost estimates is the Force Cost Information System (FCIS), Office of the Comptroller of the Army. Estimates were provided in April 1982.
- From Department of the Army, Army Modernization Information Memorandum (August 1981).
- Scaled using ratio at P<sub>2</sub>M level between FVS and M113.
- FCIS Data; includes military occupational specialty training, supply, medical, and overhead.
- Scaled using unit procurement costs of \$136,768 for M113 and \$1,017,972 for FVS (constant 1981 dollars).

### Total Costs of the M1 and the FVS

The CBO estimates that, with the fielding of the M1 tank and the FVS by 1987, the additional annual recurring costs (in 1983 dollars) to operate and support these modernized battalions will be approximately \$1.1 billion (see Table 9). If all the active tank and mechanized infantry battalions are modernized, the additional annual recurring costs are estimated at approximately \$1.5 billion.

These estimates include the costs (not discussed) of the "direct support" maintenance battalions, which perform much of the repair. (Each Army division is required to have one direct support maintenance battalion as part of its Division Support command to serve all of its battalions.) In

TABLE 9. COMPARISON OF ANNUAL RECURRING OPERATING AND SUPPORT COSTS FOR TANK AND MECHANIZED INFANTRY BATTALIONS (In millions of 1983 dollars)

Type of Battalion	Current per Battalion	Per Modernized Battalion	Total Modernized Battalions	Difference
Tank Battalion	21.1 for M60s	30.0 for M1s	1,500 for 50 Battalions	445
Mechanized Infantry Battalion	22.3 for M113s	35.4 for FVSs	1,628 for 46 Battalions	603
Maintenance Battalion, Armored Division	31.7	36.2	145 for 4 Battalions	18
Maintenance Battalion, Mechanized Infantry Division	30.4	44.1	265 for 6 Battalions	82
Total	--	--	3,538	1,148

SOURCE: Congressional Budget Office.



the absence of any cost estimate for the maintenance battalions in the armored and mechanized infantry divisions, the CBO adjusted costs for direct support to the change in each of the categories of operating and support costs at the maneuver battalion (either tank or mechanized infantry). The CBO estimates that the recurring costs of a maintenance battalion for an armored division will increase by 14 percent, from an annual \$31.7 million to \$36.2 million. The recurring costs for a maintenance battalion in a mechanized infantry division is estimated to increase by 45 percent, from \$30.4 million a year to \$44.1 million.

#### Costs of Other Systems

The extra \$1.5 billion reflects major but not the total added costs of modernizing U.S. Army ground combat forces. Several weapons systems--such as the AH-64 and the MLRS--could also incur high operating costs. Unfortunately, data on these systems are not available to allow detailed estimates comparable to those presented above for the M1 tank and the FVS. Judging from the technological sophistication embodied in these several systems, it can be assumed that additional maintenance and support costs could also be substantial. Nonetheless, these operating costs might not require dramatic increases in the Army's total budget for operations and maintenance. The \$1.5 billion in extra operating costs associated with equipping all the forces with the M1 tank and the FVS amounts to about 9 percent of the Army's 1983 budget request for operations and maintenance. If operating and support costs for the other ground combat systems comprised in the Administration's modernization plan are comparable, they may not be disproportionately large relative either to procurement costs or to their value in maintaining NATO's defensive posture.